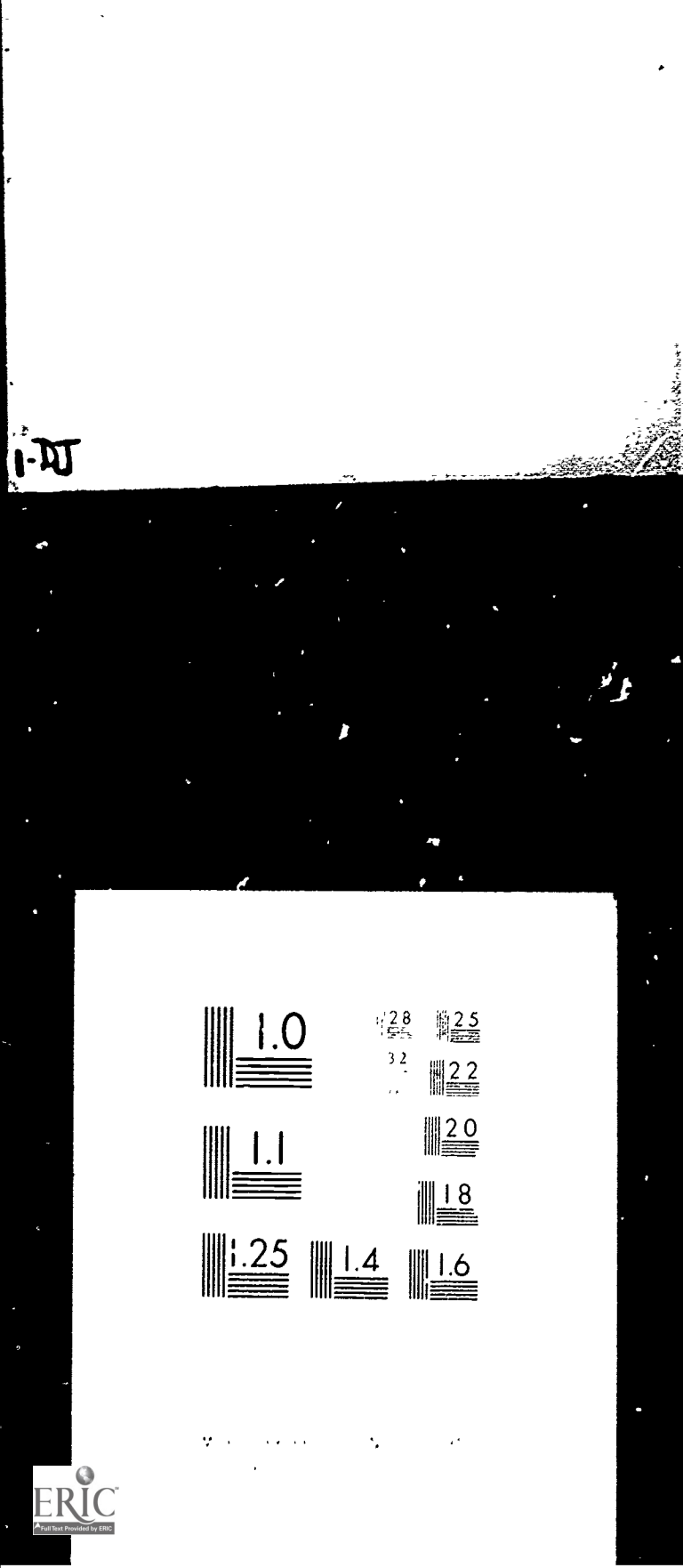
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ABSTRACT

A review of research suggests that, for at least 70 years, teachers have interacted with their students using a relatively consistent pattern involving lecturing, seat work by students, and teacher, student interaction. Yet, after thousands of research studies, educators are unable to say that these interactions have any significant impact on learning. Reactions to this state of affairs may be characterized in terms of the following positions: teaching is an art, not a science; teaching plays a very minor role in learning; teaching is a creed; and teaching is problem-solving. A theory of school learning may be posited that is based on three independent variables: student ability, student motivation, and quality of classroom communication. On a percentage basis, student ability may account for 50% of achievement variance, student motivation for 25%, and classroom communication for up to 25%. (GW)

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EFFECTS OF TEACHER BEHAVIOR ON THE ACQUISITION OF COMMUNICATION COMPETENCIES

by

Gustav W. Friedrich
Department of Speech Communication
University of Nebraska

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EFFECTS OF TEACHER BEHAVIOR ON THE ACQUISITION OF COMMUNICATION COMPETENCIES

Phillip Jackson observes that, "Aside from sleeping, and perhaps playing, there is no other activity that occupies as much of the child's time as that involved in attending school." (1968, p. 5) Translating Jackson's observation into more concrete terms, each student spends about 1,200 hours in school each year. Since individuals in the United States--as well as in most developed countries--spend between 10 and 16 years in school, a total of between 12,000 and 20,000 hours are spent in the classroom.

This significant expenditure of time warrants asking:

1. What is the nature of the communication that occurs in the classroom?
2. What is the impact of this communication on student learning?

In order to describe the nature of classroom communication, I would like you to imagine yourself back in a ninth-grade classroom. Despite some variability, your classroom probably featured a single teacher and a group of 20 to 40 students of approximately equal age. The physical room was probably rectangular, contained a desk for the teacher and smaller desks for each student, was surrounded by windows, chalkboards, and bulletin boards, and had tile or wood floors. The room probably featured a flag, patriotic pictures, a wastebasket, a pencil sharpener, supply cupboards, and exhibits of work by pupils or of material pertinent to the subject taught. Sound familiar?

In terms of the activities that take place in them, classrooms are again surprisingly similar. Nuthall and Snook (1973) summarize numerous

studies which suggest that the activities of classrooms fall into three basic forms:

1. lecturing--the teacher is talking, performing, demonstrating, or exhibiting materials. Lecturing accounts for between 18 and 22 percent of all class time.

2. lab or seat work--the student is working on his or her own. Seat work accounts for between 25 and 45 percent of all class time.

3. interaction--the teacher and students are talking with each other. The degree of teacher control varies. Interaction accounts for between 34 and 53 percent of all class time.

In focusing their attention on interaction in the classroom, Arno Bellack (1966) and his colleagues at Teachers College, Columbia University, describe a language "game" with rules for both teacher and student players. Four "moves" allow players to achieve the object of the game which is to engage in verbal discourse about subject matter:

1. Structuring. Structuring moves serve the pedagogical function of setting the context for subsequent behavior by either launching or halting/excluding interaction between students and teachers. For example, teachers frequently launch a class period with a structuring move in which they focus attention on the topic or problem to be discussed during that session.

2. Soliciting. Moves in this category seek to elicit a verbal response, to encourage persons addressed to attend to something, or to elicit a physical response. All questions are solicitations, as are commands, imperatives, and requests.

3. Responding. These moves bear a reciprocal relationship to soliciting moves and occur only in relation to them. Their pedagogical function is to fulfill the expectation of soliciting moves; thus, students' answers to teachers' questions are classified as responding moves.

4. Reacting. These moves are occasioned by a structuring, soliciting, responding, or prior reacting move, but are not directly elicited by them. Pedagogically, these moves serve to modify (by clarifying, synthesizing, or explaining) and/or to rate (positively or negatively) what has been said previously. Reacting moves differ from responding moves: while a responding move is always directly elicited by a solicitation, preceding moves serve only as the occasion for reactions. Rating by a teacher of a student's response, for example, is designated as a reacting move. (p. 4)

The rules stipulate that the teacher must do most of the talking (approximately two-thirds) and must structure the specific form and content of the verbal game. Played according to the rules, the teacher will spend most of the time asking questions and commenting on student responses, although--from time to time--s/he will spend time structuring the content and providing summaries of previous discourse.

The rules for students are more restrictive. Their primary task is to answer questions--to reply when called on. At all times the student must respond as though the teacher asks only questions a student should be able to answer. While each student will be expected to respond no more than six or seven times in an hour, s/he is expected to pay attention to the progress of the lesson. After the student has responded, the response will be repeated, praised, or otherwise commented on by the teacher. In short, most of the student's time will be taken up in listening to other students' responses and the teacher's comments on those responses.

It is interesting to note that this classroom language game has not changed substantially in seventy years (Hoelker and Ahlbrand, 1969). The earliest major systematic study of classroom interaction cited is a report by Romiett Stevens in 1912 on her four years of observing classrooms. Her results virtually duplicate those of Bellack. She found that, on the average, teachers talked 64 percent of the time--there was little difference between teachers in this regard, no matter what the subject or grade level; about 80 percent of the classroom talk was devoted to asking, answering, or reacting to questions; and the rate of teacher question-asking ranged from one to four questions per minute, with the average being about two per minute.

Adding additional support to Hoelker and Ahlbrand's conclusion is a study by Meredith D. Gall (1970) of the use of questions in teaching:

> It is reasonable to conclude that in a half-century there has been no essential change in the types of questions which teachers emphasize in the classroom. About 60 percent of teachers' questions require students to recall facts; about 20 percent require students to think; and the remaining 20 percent are procedural. (p. 713)

Research summarized by Raymond Adams (1972) indicates that these results are not unique to the United States. Dahllöf and Lundgren (1970), for example, discerned "amazing" similarities in patterns between American and Swedish data in terms of the amount of "teacher structuring" (91 percent and 86 percent), "soliciting" (81 percent and 86 percent), "responding" (22 percent and 12 percent), and "reacting" (16 percent and 21 percent). Similar results are available for Australia, New Zealand, and Great Britain.

Given a model of teaching that has endured for so long, one would assume the existence of a wealth of empirical evidence supporting the model. Such, however, is not the case. After reviewing the available literature, Heath and Nielson (1974) report:

> Our analysis of this literature leads us to [these] conclusions: First, the research literature on the relation between teacher behavior and student achievement does not offer an empirical basis for the prescription of teacher-training objectives. Second, this literature fails to provide such a basis, not because of minor flaws in statistical analyses, but because of sterile operational definitions of both teaching and achievement, and because of fundamentally weak research designs. (p. 481)

The situation, then, is this: for seventy years, teachers have interacted with their students using a relatively consistent pattern. Yet, after thousands of research studies, we are unable to say that those interactions have any significant impact on learning. How are we to respond to this state of affairs? Four of the more common reactions can be

summarized in terms of the following "philosophies" of teaching:

1. Teaching as Art
2. Teaching as Ineffective
3. Teaching as Creed
4. Teaching as Problem-Solving

Teaching as Art

One reaction argues that teaching is an Art in the dictionary sense of "a specific skill in adept performance, conceived as requiring the exercise of intuitive facilities that cannot be learned solely by study." (American Heritage, 1969) From this perspective, it is both foolish and impossible to attempt to discover laws that connect classroom communication with learning--they simply do not exist. As Gilbert Highet argues:

> It seems to me very dangerous to apply the aims and methods of science to human beings as individuals. . . . Teaching involves emotions, which cannot be systematically appraised and employed, and human values, which are quite outside the grasp of science. . . . "Scientific" teaching, even of scientific subjects, will be inadequate as long as both teachers and pupils are human beings. Teaching is not like inducing a chemical reaction: it is much more like painting a picture or making a piece of music, or on a lower level, like planting a garden or writing a friendly letter. (1954, pp. vii-viii)

While this position possesses some plausibility, N.L. Gage makes the important point that:

> Painting and composing, and even friendly letter-writing and causal conversation, have inherent order and lawfulness that can be subjected to theoretical analysis. . . . The artist whose lafulnesses are revealed does not become an automaton; ample scope remains for his subtelty and individuality. . . .
>
> So it is with teaching. Although teaching requires artistry, it can be subjected to scientific scruntiny. The power to explain, predict, and control that may result from such scrutiny will not dehumanize teaching. (1964, pp. 270-271)

James Gallagher makes the point even more strongly when he observes:

> Is teaching an art? Indeed it is. Perhaps too much of one. Surgery was once too much an art and many people died as a result. Cooking is an art, and while few people die of it these days, drugstores do a thriving business in remedies for misbegotten creative culinary efforts. For when a set of skills is in a developmental stage where people say "It is an art," they mean several things. First, that there are only a very few persons who have the skills that can identify them as highly effective practitioners, as "artists." Second, even these artists cannot give a systematic account of how they practice their art, and they are reduced to modeling their performance for those who would learn from them. But it is hard to imitate the true artist, and his genius too often dies with him. . . .
>
> Those interested in the improvement of education and teaching would like to remove some of the mystery of the art of effective teaching through systematic study. (1970, p. 30)

Some potentially productive areas for systematic study will be specified later in this paper.

Teaching as Ineffective

A second reaction is to argue that teaching plays a very minor role in learning and, therefore, one should not expect to find significant relationships between classroom communication and learning. The Coleman report (1966) and its offshoots (Jencks, 1972; Mosteller and Moynihan, 1972) have frequently been used to support this argument. These investigators claim that family background, socio-economic status, ethnicity, and the like are the major causal variables that affect between-school differences in achievement and that teachers only minimally affect student achievement. Heath and Nielson (1974), cited earlier, reached the same conclusion in their review of the studies of teacher clarity, use of student ideas, criticism, enthusiasm, and other variables commonly accepted as skills or competencies. They conclude, first, that there is no established empirical relation

between teacher behavior and student achievement; second, that the flaws in the research are due to nonsensical statistical analyses, weak research designs, and sterile operational definitions of teacher behavior and student outcomes; and third, because of the strong association between omnibus measures of student achievement and socio-economic and ethnic status, the effects of teachers and techniques of teaching on achievement are bound to be trival.

While it is difficult to argue with Heath and Nielson's first two points, whether or not they are correct about socio-economic and ethnic influences is still an open question. Duncan and Biddle (1974), for example, make the point that the studies which support this argument are "statistically artifactive and are based on differences among schools rather than among individual teachers classrooms." (p. 20) In a later section of this paper, additional evidence will be presented that softens Heath and Nielson's argument even further.

Teaching as Creed

A third reaction--teaching as creed--is by far the most popular. Wallen and Travers (1963) suggest that creeds are:

1. derived from teaching traditions (e.g., we teach as we were taught)
2. derived from social learnings in out background (e.g., we reinforce the behavior of pupils so as to develop a middle-class ideology)
3. derived from philosophical traditions (e.g., we teach in accordance with the Rogerian or the Skinnerian tradition)
4. generated by our own needs (e.g., we adopt a lecture method because we need to be self-assertive)
5. generated by conditions existing in the school or community (e.g., we conduct out classroom in such a way as to produce formal and highly disciplined behavior because this repr nts the pattern required by the principal)

Whatever their source, creeds are justified on the basis of enthusiasm and/or plausible argument rather than on empirical data. It is possible, therefore, to move from television as creed in the 1950s to teaching machines and programmed instruction in the 1960s to mastery l ing and performance- or competency-criteria in the 1970s. While not rejecting any of these choices, it is necessary to point out that there is not now, and there will not be for some time, any empirical evidence on which to base choices among creeds.

Teaching as Problem-Solving

If we assume that classroom communication affects learning in ways that we can--but have not yet--discovered, we derive a fourth reaction: teaching as problem-solving. Such a position has implications for both teachers and researchers. For researchers, it implies granting a high priority to conceptualizing and executing sophisticated, systematic research programs aimed at generating the necessary data base. Since teachers must continue to operate in advance of this data base, the implication for teachers is that they must become researchers who develop creative and innovative approaches to teaching which they try and test in their classrooms. The role of the teacher, then, becomes that of researcher and problem-solver. To facilitate both roles in this venture, I turn now to an explication of the role of classroom communication in a theory of school learning. While the terminology and order of presentation have been changed, the ideas and the data supporting them are drawn largely from Benjamin S. Bloom's (1976) book Human Characteristics and School Learning.

A Theory of School Learning

Three independent variables are central to this theory:

1. Student ability: the extent to which the student already possesses the basic prerequisites for instruction

2. Student motivation: the extent to which the student is (or can be) motivated to engage in the learning process

3. Quality of classroom communication: the utility of teacher-student and student-student interactions for learning

The outcomes, or dependent variables, that are a product of these three independent variables and their interactions are level and type of achievement--that is, the degree to which the student acquires specified knowledge, skills, and/or attitudes. Because the research is more thoroughly developed in the area of knowledge, this review is focused primarily on knowledge as the dependent variable.

Student Ability

Specifying the independent impact of student ability on the learning of content can be done at both the macro (over a total course of instruction) and micro (over a unit of instruction within a course) level. At the macro level, student abilities can be assessed by achievement tests (actual learning of content), aptitude tests (ability to learn content), and general intelligence tests (a global measure of aptitude). Summarizing Bloom's data for these four sources of prediction, we discover that:

1. Achievement tests: in general, almost three-fourths of the variation in achievement at the end of the course is predictable from the measure of achievement or pretest before the course started.

2. Aptitude tests: for introductory courses in arithmetic, mathematics, reading, and a second language, the relation between total scores on aptitude measures and later achievement in these courses (either grades or achievement tests) averages about .63 (.70 when corrected for the unrelaibility of the measure).

3. General intelligence measures: typically correlate about .50 (±.10) with achievement over a great variety of courses and subjects.

4. Unit tests: in micro-studies of mastery learning conducted at the University of Chicago, student ability accounted for about 50 percent of the variation in achievement.

Based on four sources of prediction, therefore, it seems safe to conclude that student ability can account for up to one-half (r = .70) of the variance on relevant cognitive achievement measures.

Student Motivation

Student motivation refers to the fact that individuals vary in what they are emotionally prepared to learn as expressed in their interests, attitudes, and self-views. Like student abilities, motivation has been measured at both the macro and micro level. At the macro level, measurement has focused on subject-related affect, school-related affect, and academic self-concept. Summarizing Bloom's data, we discover:

1. Subject-related affect: International Study of Achievement (IEA) studies in mathematics, science, literature, reading comprehension, French as a second language, and English as a second language discovered that affect toward a subject generally accounts for between 10 and 17 percent of the vari .ion in achievement--with a for studies, especially in the later years of school, reaching almost 20 percent of the variation in achievement.

2. School-related affect: attitudes toward school and school learning can account for as much as 20 percent of the variation in school achievement. The correlation is relatively low in grades 1-5 but grows stronger with age.

3. Academic self-concept: attitudes toward self about school learning account for about 25 percent of the variation in school achievement after the elementary school period. The relationship is lower for academic self-concept in a particular subject (math, science) than it is for general academic self-concept.

Combining two or three of the above measures to predict school achievement yields no higher relation than the highest of the two or three. For prediction purposes, therefore, academic self-concept is the most useful

4. Unit interest: in general, interest at the beginning of a learning task and achievement at the end of the task correlates about .30 (.38). The relation between achievement at the end of one learning task and interest at the beginning of the next learning task averages about .30 (.38) also. Thus achievement and subject matter affect are interrelated and each influences the other in a kind of spiral effect.

Based on four sources of prediction, therefore, it seems safe to conclude that student motivation can account for up to one-fourth (r = .50) of the variance on relevant cognitive achievement measures.

Independently, then, student ability allow- account for 50 percent of achievement and student motivation for 25 percent. When we combine the two variables in a prediction equation, because they are correlated we are able to account for 65 percent of the variance on relevant cognitive achievement measures. That is, 65 percent of the learning that occurs in a classroom is determined by prior student ability and student motivation. The remaining 35 percent must be partitioned among quality of classroom interaction, measurement error, and a variety of other potentially relevant variables.

Quality of Classroom Communication

Classroom communication is not a product of teacher characteristics; they rarely account for more than 5 percent of the achievement variation of student. Neither is it a product of characteristics of classrooms and schools: these characteristics rarely yield correlations which account for more than 5 percent of achievement variation. It is teaching, not the teacher, and classroom environment, not physical characteristics, that influence school learning. Bloom's review of relevant literature suggests that the effects of quality of classroom communication may account for up to 25 percent of achievement variance.

Added to the 65 percent contributed by student ability and motivation, it is possible to account for 90 percent of the variance in student achievement.

Although the elements that compose quality of classroom communication are not yet conclusively documented, a hint of their identity is provided by Rosenshine and Furst (1973). Nine variables yielded consistent results across fifty-odd studies in which naturally occurring teacher behavior was related to measures of student growth: (1) clarity, (2) variability, (3) enthusiasm, (4) task-oriented and/or businesslike attitude, (5) criticism, (6) teacher indirectness, (7) student opportunity to learn criterion material, (8) use of structuring comments, and (9) multiple levels of questions or cognitive discourse.

The temptation to consider these variables obvious, if not trite, is offset by the realization that a number of other seemingly plausible and virtuous sounding variables have not correlated well with student achievement: nonverbal approval (counted), praise (counted), warmth (rated), the I/D ratio, or ratio of all indirect teacher behaviors (acceptance of feelings and ideas, praise and questions) to all direct teacher behaviors (lecture, directions and criticism) (counted), questions or interchanges classified into only two cognitive types (counted), student talk (counted), and student participation (rated) Rosenshine and Furst, 1973).

It must be acknowledged that the results cited above are largely correlational in nature. Thus, we do not know, for example, whether (1) students learn more when teachers are indirect, (2) teachers are more indirect when students demonstrate more learning, or (3) additional, unspecified variables produce both indirectness and achievement. While

the research necessary to untangle such overlapping relationships is progressing, Rosenshine (1970) was able to locate only fifteen studies in which teachers were trained to teach a class of students in a specific manner, observational measures were collected to verify that teachers behaved as intended, and end of experiment measures (such as achievement scores) were obtained.

Rosenshine and Furst's nine variables, then, are nine dimensions of classroom communication which teachers can try and test in their classrooms. As they engage in this process of inquiry, teachers should be aware of the role that participation can play as an index of the quality of classroom communication. Bloom (1976, p. 123) cites data that, when the class group is the unit for assessing participation, the correlation with either final achievement or gain in achievement is very similar--.27. when the individual's participation was observed or measured, the correlation with final achievement was .42, while the correlation with gain in achievement was .58. Since, therefore, about 20 percent of the variation in achievement of individuals is accounted for by their participation in the classroom learning process, participation is a convenient way for the teacher to assess the quality of classroom communication. While it is likely that this participation must be overt for young children to learn, covert participation--if it is ensured--is highly effective for older learners.

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